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ABSTRACT

This paper explores the teaching of thinking through description and analysis of the infusion approach as exemplified in the work of Robert Swartz, David Perkins, and Sandra Parks. After consideration of a substantive contentious issue raised by the analysis, the logic of curriculum decision-making in relation to the choice of ways of teaching thinking is considered. A way of discussing the exemplar is explored along with a view to the possibility of applying the same approach to discussing two other ways of teaching thinking skills: critical thinking and critical thinking within the subject disciplines (the framework approach). Analysis reveals a substantive contentious issue that may help shed light on the issues to be considered in establishing the logic of curriculum decision making. What remains to be seen is whether this connection is informative in relation to mapping the arguments for curriculum choices, and whether a similar approach can be used in considering other ways of teaching thinking skills. (ASK)

TEACHING THINKING SKILLS: MAPPING THE ARGUMENTS FOR CURRICULUM CHOICES REVISITED ®

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Abstract

This paper explores the teaching of thinking through description and analysis of the infusion approach, as exemplified in the work of Robert Swartz, David Perkins and Sandra Parks. After consideration of a substantive contentious issue raised by the analysis, the paper considers the logic of curriculum decisionmaking in relation to choice of ways of teaching thinking.

INTRODUCTION

In a recent paper published in *Educational Theory* Sophie Haroutunian Gordon (1998) drew attention to two issues in education: a current emphasis on teaching people to think and a problem as to what should be done to bring this about. In examining this problem, Dr Bruce Haynes and I are in the process of exploring the concepts of critical thinking, infusion, philosophy for children and critical thinking framework with a view to mapping the arguments required to justify inclusion in a curriculum designed to teach thinking. Our present plan is to explore the conceptual issues and the contentious issues relative to each of these concepts and then to consider the curriculum arguments.

WAYS OF TEACHING THINKING

The teaching of thinking skills may be included in the curriculum in a variety of ways. They may be taught as skills within their own right under the label of critical thinking. They may be taught as a reflective exercise on how thinking occurs within and across the subject disciplines (the infusion approach). They may be taught within a programme of philosophy for children. Or they may be taught as a particular way of encountering and comprehending the subject disciplines (the framework approach). A short description of each approach and an analysis of related contentious issues is a possible first step to take in mapping the arguments for curriculum choices. This paper presents an example of how this description and analysis might be done, using the infusion approach as the exemplar.

To illustrate the sorts of issues which can arise as a result of such a description and analysis I refer to Melville Jones (1998) in which philosophy for children is used as the exemplar. For the purpose of description I drew on a contemporary Australian view of Matthew Lipman's work and suggested that there were two sets of issues to be considered. The first set of issues related to content, where three problems were identified. The first problem was the approach which philosophy for children takes to knowledge of great ideas and knowledge of great thinkers in philosophy. The second was the problem of children's rights. The third problem was the relationship of philosophy to other subjects. The second set of issues related to method where two problems emerged. The first problem was the conflicting interpretations of the notion of experience. The second was the problem of egalitarianism.

The interest in that paper, and also in this paper, is to establish how best to examine the possible ways of teaching thinking skills which have been identified. The description and analysis of related contentious issues is the approach adopted in these exemplars, but it may not be the most appropriate approach to use or it may not be an approach which will suit an examination of all the possible ways of teaching thinking skills.

The paper concludes with a preliminary overview of the logic of curriculum decisionmaking.

HOW THINKING OCCURS ACROSS THE SUBJECT DISCIPLINES (INFUSION): THE DESCRIPTION

The infusion approach is usually identified with the work of Robert Swartz and David Perkins and, more recently, Sandra Parks. 'Infusion' was the term used earlier by Swartz in an overview of teaching thinking in a book entitled *Teaching Thinking: Issues and Approaches*, which was written with Perkins and published in 1989. He described it then as "infusing teaching for thinking into regular classroom instruction by restructuring the way traditional curriculum materials are used" (Swartz and Perkins, 1989, p. 68). What Swartz and Perkins had in mind was the structuring of lessons in subject-area instruction so that students would be able to gain and apply what they called the "ingredients" of thinking, both in academic work and in everyday living. The upshot was "infused thinking skill lessons" (p. 68).

Some of the ingredients which Swartz and Perkins exemplified in the description provided, of various infused thinking skills lesson are reliability, causal explanation and the use of evidence for inference. Standard subject content is restructured in the infusion approach so that these ingredients are high-lighted. As a result students become conscious of them and thus gain a "metacognitive awareness" (p. 73) which extends to cover a range of different thinking skills, depending upon the teacher's choice. The general thrust of the infusion approach is summed up very well in a heading which appears on p. 74 of *Teaching Thinking: Issues and Approaches*.

How to Construct Lessons that Infuse Teaching Thinking Skills
in Subject-area Instruction Through restructuring Traditional
Content.

The restructuring of content is designed to shape the content around a different structure - that of a thinking skill. Thus a "thinking map" (p. 76) which exhibits the structure of the thinking skill in question is used in the construction of the infused lesson. For example, to teach the thinking skill of causal explanation a map such as the following might be used (p. 77)

Table 4.3 Map of Causal Explanation

1. What are possible causes of the event in question?
2. What could you find that would count for and against the likelihood of these possibilities?
3. What evidence do you already have, or have you gathered, that is relevant to determining the cause?
4. What possibility is rendered most likely, based on the evidence?

The lesson structure is thus based not on the subject content but on the structure of the thinking map, which is applied to the lesson content through planned questions or activities. The all-important tasks for the teacher are first, to get to grips with the structure of the thinking skill and then to infuse that structure into the lesson content. This is done with a view to getting students aware of the skill and also understanding it and applying it in other contexts, both in the classroom and in their broader lives. To this end, a further requirement of the students is "reflective and deliberate practice" (p. 85) which is "based on a blending of metacognitive awareness of the appropriate forms of thinking to be used and reflection on new and varied examples" (p. 85). An infusion lesson will contain three basic features:

1. The active structured use of thinking skills.
2. Creating an awareness of the thinking that students are doing.
3. Varied reflective practice in applying the skill.

(Swartz and Perkins, 1989, p. 87)

A further point of note about the infusion approach is that it is not seen to be in any way subject specific. Swartz and Perkins endorse the view that infusion can and should cut across the traditional subject boundaries so that thinking skills are taught across the curriculum. They enunciate their position in the form of a principle, expressed in the following terms.

Goals in teaching thinking should be based as much as possible on a general conception of good thinking that cuts across the traditional academic subjects.

(Swartz and Perkins, 1989, p. 88)

Thus the thinking map of, say, causal explanation can be applied to many different subject areas taught at many different age levels.

It is important to be clear, however, that it is the standard subjects which constitute the framework within which the infusion approach operates. Moreover, "content indifferent" lessons which focus only on teaching specific thinking skills should be "bridged" into the standard curriculum in order to maximise their effectiveness (p. 126). Bridging of stand alone programmes is in fact seen to be crucial to maximise teaching thinking skills (p. 126) and an example of infusion at work. The emphasis is on the use of "appropriate material already in the curriculum" (p. 123).

Finally, how does infusion see the range of thinking skills which can be taught? In their handbook for teachers, Swartz and Parks include what they label a "map of the thinking domain".

Map

Analysis of this map suggests that the infusion approach recognises a basic distinction between *thinking skills*, which are based on clarification and understanding, creative thinking and critical thinking, and *thinking processes*, which are decision making and problem solving. *Thinking skills* include skills at clarifying ideas (analysing ideas by comparing/contrasting, classification/definition, parts/whole relationship, sequencing); skills at generating ideas by generating possibilities (generating possibilities by multiplicity of ideas, varied ideas, new ideas, detailed ideas) and by creating metaphors (analogy/metaphor); and skills at assessing the reasonableness of ideas by assessing basic information (accuracy of observation, reliability of sources) by inference (use of evidence for causal explanation, for prediction, for generalisation and for reasoning by analogy) and by deduction (conditional reasoning if ... then). *Thinking processes* include decision making skills and problem solving skills (generating ideas, clarifying ideas and assessing the reasonableness of ideas) (Swartz and Parks, 1994, p. 7).

THE INFUSION APPROACH: THE SUBSTANTIVE CONTENTIOUS ISSUE

The contentious issue identifiable in the infusion approach relates to the claim that infusion lessons improve student thinking. The issue here is the logic of thinking skills. The map of the thinking domain which Swartz and Parks provide does not suggest any sort of order or sequence in which the thinking skills presented ought to be taught. At the macro level clarification and understanding, creative thinking, critical thinking, decision making and problem solving are all shown diagrammatically as separate locations on the map. At the micro level each of these locations has its own particular set of skills and subskills, for example, under clarification and understanding, the skill of analysing ideas and the subskills of comparing/contrasting, classification/definition, parts-whole relationships and sequencing. The question that arises is whether these skills have to be taught in some sort of ordered sequence or whether they should be seen as necessarily connected to the subject matter content.

The first of these two possibilities would mean that infusion lessons would have to be based on the kind of logical sequence that is usually found in standard critical thinking courses. The thinking skills taught would proceed from simple to more complex, moving from the basic skill of understanding in a single step of inference from reason to conclusion to the highly complex skill of full scale diagramming of long complex arguments and evaluating the strength of each step of inference within the argument. The infusion lessons would then proceed in some sort of sequence of thinking skills which moved in similar fashion from the most simple to the most highly complex.

However, there does not seem to be any wish to develop such a hierarchy in Swartz and Parks' approach. Even the location on the map of the thinking domain labelled critical thinking does not indicate that there is any logically necessary, or even desirable order to follow in teaching skills related to basic information (accuracy of information and reliability of sources) and skills related to inferences (causal explanation, prediction, generalisation, reasoning by analogy and conditional reasoning).

It is possible that thinking maps, to which Swartz and Parks draw attention (pp. 508 ff.) might suggest an order of events. A thinking map is

a structured list of key questions phrased in the language of the thinking skill or process which leads to an informed judgement.

(Swartz and Parks, 1994, p. 508)

The questions are

sequenced in a natural order to represent effective ways of organising one's thinking.

(Swartz and Parks, 1994, p. 508)

The thinking map, wherever possible, should be derived by the teacher "from students' understanding of the thinking skill or process" (1994, p. 509). But just how structure and sequence are achieved is left unclear. With all due respect to the authors, this may seem the equivalent of the Irish farmer's advice in response to the tourist's request for directions - "wherever you're going, it would be better not to start from here!"

It may, in fact, be the case that Swartz and Parks are not concerned with trying to establish any sort of order or sequence in the teaching of thinking skills. To some extent, this view finds support in a comment which they make on the subject of finding contexts for infusion lessons, where they state

Not sequential . Although thinking skills and processes may usually be taught in any order, there are a few cases in which it is desirable, but not necessary, to teach some skills or processes before others. For example, compare and contrast involves classification and analogy. Identifying reasons and conclusions plays a role in uncovering stated assumptions.

(1994, p. 533)

Such a comment suggests that, while they are not unaware of the issue of the logic of thinking skills, they prefer to acknowledge it in passing only, presumably to avoid distraction from their main concern of showing how to teach skilful thinking through infusion lessons.

So the locations on their map of the thinking domain may be there simply for the purpose of conceptual clarification, as may the skills and subskills attributed to each. If this is so there remains then the second possibility that infusion lessons must contain thinking skills which are necessarily connected to the subject matter content.

Considered in this kind of context, the issue of the logic of thinking skills assumes a different guise. As we have seen, according to Swartz and Parks traditional subject content can be restructured so that a particular thinking skill is infused into the lesson by shaping the lesson content around the structure inherent in that skill. The students' attention is then focused on recognition of the skill and application of it in other situations. The order of presentation of curriculum content would thus dictate the order of presentation of the thinking skills. However, it seems unlikely that Swartz and Parks would look for any ordering of content to reflect an order in thinking skills.

Moreover, they specifically repudiate the view that certain types of thinking are not accessible to younger children (1994, p. 532) in favour of supporting the goal of "a full range of instruction in skilful thinking at any grade level" (1994, p. 532). So while they recognise methods of instruction as being "developmentally appropriate" (p. 532) it seems that all thinking skills can potentially be taught at all ages.

Swartz and Parks suggest that the teacher should use three procedures to find contexts suitable for infusion lessons: using "menus", which they themselves provide, or which teachers create, which are a list of suggested contexts for infusion lessons; scanning the curriculum for key topics which "showcase" a particular thinking skill and allow good transfer lessons to be prepared; and carrying out a review of curriculum guides and texts for topics or objectives suited to infusion lessons (1994, pp. 532-537).

A comment to teachers carrying out such a review hints at their awareness of sequence in relation to content.

Indicate which contexts seem best suited for initial lessons and transfer examples, taking into account the order in which content objectives are usually taught in the school year.

(1994, p. 534)

The conclusion seems to be that content is recognised as having a logic, which is presumably apparent in the order of content objectives, but thinking skills do not have an overall inherent logic. Rather, their presentation will depend on the content selected.

In contrast to the position taken by Swartz and Parks, other approaches to teaching thinking skills uniformly tend to recognise a logical sequence in the order of their presentation to students. A notable example is the kind of text which is used to support the teaching of critical thinking. Many (although not all) such texts follow a standard pattern in the presentation of content. One such typical text is the book by Trudy Govier entitled *A Practical Study of Argument* . The student is led through a series of chapters, beginning with the nature of argument and the structure of argument, moving on to truth and validity in argument, some standard fallacies, then to diagramming arguments and considering deductively valid arguments in categorical and propositional logic, inductive arguments and, finally, the application of these phenomena to social science and social life, looking specifically at cause, correlation and explanatory inductions.

Writers in the school of critical thinking would argue that thinking skills are embedded in formal and informal logic and that logic of both kinds has its own logic. This in turn dictates an order of presentation of material, so that the student gradually builds up from simple reason-conclusion connections to very complex applications of logical understanding in theoretical frameworks. They could argue that the infusion approach, when based on order of content objectives, might well result in both a narrow coverage of thinking skills taught and/or an undesirable lack of logical order in teaching them.

Given the contentious issue which has been identified, what else should the curriculum decision maker take into account in considering infusion as a preferred mode for teaching thinking skills? The other significant issues are embedded in the arguments and evidence relevant to the logic of curriculum decision making. The concluding section of the paper sets out some of these issues, which come into play when curriculum choices about thinking skills are to be made.

THE LOGIC OF CURRICULUM DECISION MAKING

To justify the teaching of thinking skills, in any form, it must first be established that thinking skills are a curriculum good, that they are more valued than other competing curriculum goods that could be included and that they can be taught. Having established all these matters, we may conclude that thinking skills should be taught. We may then use this conclusion to justify any activity which teaches thinking skills to students. However, it is then further required that any proposed method of teaching thinking skills should be better than any other ways of achieving this curriculum good.

This process of curriculum decision making can be rendered as follows:

X is a curriculum good,
 X is better than other curriculum goods,
 X can be taught,
 therefore,
 X should be taught.
 However,
 X can be taught as A or B or C or D.

We have already identified four ways of teaching thinking skills, viz. critical thinking, infusion, philosophy for children and critical thinking framework. Given the conclusion that thinking skills should be taught, to judge which of these alternatives is best requires a prior decision. For the judgement may be made either in terms of the best way of teaching thinking skills or the best way of educating children which includes teaching thinking skills.

Whatever terms are used in making the judgement, some factors are relevant to consider in the matter of teaching thinking skills. While all four ways teach thinking skills they also do other things, require different resources and have different outcomes.

Critical thinking seems the nearest to teaching thinking skills *per se* but with a set of desired attitudes as part of the outcome. It requires resources in the form of teacher competence, teaching materials and additional allocated timetable time.

Philosophy for children teaches thinking skills in philosophy and has a different set of desired attitudes. It requires resources in the form of teacher competence in philosophy, teaching materials and a timetable slot which would displace other teaching.

Infusion teaches thinking skills as part of other subjects with attitudes that may be part of the attitudes fostered by study of those subjects. Teacher competence and teaching materials may be similar to that required by critical thinking and specified time is required to teach the infusion material.

The framework approach encourages a different attitude on the part of teachers towards their teaching and evaluation of other subjects but does not presuppose a specific time allocation for teaching thinking skills. It requires teacher competence in teaching and evaluating thinking skills within a subject, not necessarily the competence required in critical thinking.

After laying out the variables to be considered in judging which alternative is best, more detailed consideration of the variables may look something like the following.

The quality of thinking skills learned in each way of teaching may be compared. Perhaps it could be judged that the breadth and depth of thinking skills learned in philosophy for children is better than that in critical thinking, as the children are able to associate the skills with particular philosophical conclusions they are able to reach. Perhaps the quality of skills learned by the infusion way is better than that in the framework because specified attention is paid to teaching these skills through dedicated lessons using particular materials. It may even be possible to rank order the quality of thinking skills taught by each way.

In addition to these considerations, which have been cast here as rankings, it is also pertinent to determine whether the outcomes achieved by students from each of these ways of teaching thinking skills are equivalent in terms of being useful in other situations. While it may be that technical mastery of thinking skills is achieved better by critical thinking than by other ways, it may be that students are able to make more effective use of those skills if they are learned in other contexts.

Likewise it may be possible to identify the different attitudes desired by each way of teaching thinking skills and to rank order the sets of attitudes in terms of desirability. Perhaps philosophy for children opens up types of questions which are in addition to the critical attitudes sought by critical thinking. It may be that neither infusion nor framework seek these critical attitudes but are more limited to technical skills of argument located in subject areas. The attitudes they seek to teach may be those more related to the subjects taught.

Ranking-the-level of resources-required in terms of teacher competence may be relatively easy.-The-framework way of-teaching

thinking skills requires teachers to make more explicit and extend skills they already have and assume their students will acquire by studying a subject. Both the infusion and critical thinking ways require teachers to learn specific thinking skills and methods of teaching those skills. Philosophy for children requires teachers to have some understanding of philosophy as well as specific thinking skills.

No specific learning materials are required for the framework but considerable assistance is needed to enable teachers to conduct the required evaluations. The other ways of teaching thinking skills require specific learning materials and varying levels of evaluation assistance.

Dedicated timetable allocation is required for philosophy for children and critical thinking. Such an allocation has the advantage that the activity is more likely to be carried out by teachers in the classroom. It has the disadvantage that it means that something else must be displaced, thus raising the issue of whether it is better than other curriculum goods in a direct manner. The infusion way reduces this issue by inserting the teaching of thinking skills into allocated timetable space and only displaces some content from that timetabled subject. The framework minimises this issue by seeking to change the way teachers see what they and the students do rather than dedicate significant amounts of time to specific thinking skills activities.

All of these considerations relate to a judgement about the best way of teaching thinking skills. There is still more to be considered in judging which is the best way of educating students which includes teaching thinking skills. This is so because the best way of teaching thinking skills may not meet our moral standards or may include some additional features which should lead us to judge that another way was better. None of the identified four ways of teaching thinking skills obviously contravenes the common moral standards applied to schooling. However, each of the identified ways contains additional features which are relevant in a judgement as to the best way of educating students.

Both infusion and framework minimise the consideration of additional features by operating within the established curriculum judgements contained in the timetabled subjects in schools. Critical thinking operates outside these subjects and thus requires consideration of the value of the material to be excluded as a result of its inclusion. Philosophy for children not only requires that kind of consideration but also a judgement about the merit of children studying philosophy of the kind presented in that way of teaching thinking skills.

CONCLUSION

This paper has considered an exemplar, infusion, as a way of teaching thinking skills. It has explored a way of discussing the exemplar, with a view to the possibility of applying the same approach to discussing two other ways of teaching thinking skills: critical thinking

and critical thinking within the subject disciplines (the framework approach). The analysis has revealed a substantive contentious issue which may help to shed light on the issues to be considered in establishing the logic of curriculum decision making. What remains to be seen is whether this connection is informative in relation to mapping the arguments for curriculum choices. What also remains to be seen is whether a similar approach can be used in considering the other ways of teaching thinking skills which are to be explored.

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